



The "kidney" or "ramshorn" type of exhaust system, which gives a noise reduction equal to that obtained with the more usual perforated tail pipes, is standard equipment on certain R.A.F. machines, notably the Handley Page Heyford. (*Flight* photograph.)

IN SEARCH of SILENCE

Exhaust Noise the Chief Problem at Cruising Speeds : Some Hitherto Unpublished Information on Official Engine Silencing Experiments : Modern Proprietary Silencers Reviewed

engine noise: the sound made by the exhausting of the gases; the hissing roar at the intake of the carburetter; and the general clatter of mechanical parts. It has been found that at high speeds the noise of the airscrew is usually greater than that due to the exhaust, but at normal cruising speed the exhaust note dominates. In a number of cases the exhaust noise actually falls below the sound caused by the passage of the machine through the air. Poppet valves are the main contributors to the mechanical noise: the screaming of gears is not so serious as might be expected.

Sleeve-valve Silence

The sleeve-valve engine has effected a considerable reduction in sound. This type of unit has no external moving parts; its valve gear is simplified and is more positively actuated; at the speeds at which it operates its port-opening diagram shows greater efficiency; and its expansion characteristics are claimed to permit the exhaust gases to be released at comparatively low temperature and pressure. Anyone who was present at the S.B.A.C. Display last year when the Bristol Bullpup (Aquila, sleeve-valve) and the Bulldog (Mercury, poppet-valve) were in the air at the same time will remember the comparative quiet of the Bullpup. Noise, incidentally, is apt to give a false impression of speed.

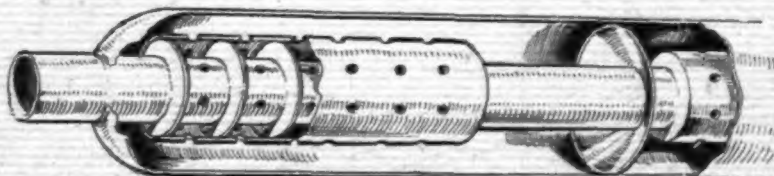
Refinement in the design of various components of the poppet-valve engine will reduce mechanical clatter, and further progress might be made through the introduction of sound-absorbing qualities into the engine cowling.

At this juncture it becomes necessary to give some explanation of the method used in this country to measure aircraft noise. Since sound is a form of energy, its intensity may be expressed as a rate of energy flux, which may be given in terms of the pressure amplitude of sound waves. The response of the human ear to changes of intensity is not linear, but approximately logarithmic, and the system of intensity notation depends upon the decibel, the actual intensity of a sound being expressed as so many decibels

WHEN a child wishes to convey the impression of an aeroplane it sets about creating an uncivilised booming roar. Any idea of passage through the air is of secondary importance: the aeroplane is primarily a maker of noise. While infant vocal chords are made to suffer in this manner aerial travel will be held in awe or contempt by many people who should fly regularly; the bomber must advertise its presence; protests against nocturnal exercises by the R.A.F. will be arrayed at certain periods in the Press; and scientists must continue to collaborate in their endeavours to restore quiet to the sky.

This article (for many of the data in which *Flight* is indebted to the Royal Aircraft Establishment, Farnborough) is intended as a review of what is being done to silence the aero-engine, the greatest, but not as is popularly thought, the only offender. The high-speed airscrew is highly undesirable if quiet is to be attained, and the motion of the airframe through the air is another source of noise. In an aeroplane which is not aerodynamically clean, such items as wires, struts, venturis and wireless aerials present additional problems.

There are three main contributory factors to



An R.A.E. silencer. Note the two "high-frequency" elements, consisting of portions of the centre tube surrounded by larger perforated tubes and annular compartments.

